DOCUMENT RESUME

ED 113 204 SE 019 780

AUTHOR Abernatha, Evelyn; Wiles, Clyde A.
TITLE A Three Month Trial of Developing Mathematical Processes (DMP) with Ten Educable Mentally Retarded Children. Technical Report No. 336.
INSTITUTION Wisconsin Univ., Madison. Research and Development Center for Cognitive Learning.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
REPORT NO WRDCCL-TR-336
PUB DATE May 75
CONTRACT NE-C-00-3-0065
NOTE 31p.; Report from the Project on Conditions of School Learning and Instructional Strategies

EDRS PRICE MF-$0.76 HC-$1.95 Plus Postage
DESCRIPTORS *Curriculum; *Curriculum Evaluation; *Educable Mentally Handicapped; Elementary Education; *Elementary School Mathematics; *Instruction; Manipulative Materials; Mathematics Education; Objectives; Placement
IDENTIFIERS *Developing Mathematical Processes; DMP; Research Reports

ABSTRACT

The purpose of this study was to assess the usefulness of the elementary mathematics program Developing Mathematical Processes (DMP) for educable mentally retarded (EMR) students. The subjects of this study were 10 children from an intact class designated EMR. The children ranged in age from 7 to 12 years. The 1972 Developmental Edition of the DMP program was used in this trial, which encompassed three months. Placement into the program was guided by the data from the program's placement inventories supplemented extensively by teacher judgment. Selected topics and activities from Levels 1, 2, and 3 were used in the course of instruction. The test data attested to the appropriateness and effectiveness of the DMP materials for these subjects; the objectives of each topic attempted were mastered with few exceptions. Children's interest was evidenced by a general willingness to begin new activities and by their maintaining appropriate behavior. The teacher's evaluation of these materials was very positive, but inadequacies were cited in the placement processes. The most important single factor in the opinion of the teacher of these children was that every student experienced success at his own pace and level. (Author/SD)

Technical Report No. 336

A THREE MONTH TRIAL OF DEVELOPING MATHEMATICAL PROCESSES (DMP) WITH TEN EDUCABLE MENTALLY RETARDED CHILDREN

by

Evelyn Abernatha and Clyde A. Wiles

Report from the Project on
Conditions of School Learning and Instructional Strategies

Thomas A. Romberg and John G. Harvey
Principal Investigators

Wisconsin Research and Development
Center for Cognitive Learning
The University of Wisconsin
Madison, Wisconsin

May 1975

Published by the Wisconsin Research and Development Center for Cognitive Learning, supported in part as a research and development center by funds from the National Institute of Education, Department of Health, Education, and Welfare The opinions expressed herein do not necessarily reflect the position or policy of the National Institute of Education and no official endorsement by that agency should be inferred

Center Contract No NE-C-00-3-0065

WISCONSIN RESEARCH AND DEVELOPMENT CENTER FOR COGNITIVE LEARNING

MISSION

The mission of the Wisconsin Research and Development Center for Cognitive Learning is to help learners develop as rapidly and effectively as possible their potential as human beings and as contributing members of society. The R&D Center is striving to fulfill this goal by

- conducting research to discover more about how children learn
- developing improved instructional strategies, processes and materials for school administrators, teachers, and children, and
- offering assistance to educators and citizens which will help transfer the outcomes of research and development into practice

PROGRAM

The activities of the Wisconsin R&D Center are organized around one unifying theme, Individually Guided Education.

FUNDING

The Wisconsin R&D Center is supported with funds from the National Institute of Education; the Bureau of Education for the Handicapped, U.S. Office of Education; and the University of Wisconsin.

TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

The purpose of this study was to assess the usefulness of the elementary mathematics program Developing Mathematical Processes (DMP) for educable mentally retarded (EMR) students. The subjects of this study were 10 children from an intact class designated EMR. The children ranged in age from 7 to 12 years; the school is located in an urban northwest Indiana school corporation. The 1972 Developmental Edition of the DMP program (Developing Mathematical Processes, 1972) was used in this trial which encompassed the last three months of the 1973-74 school year.

Placement into the program was guided by the data from the program's placement inventories supplemented extensively by teacher judgment. Selected topics and activities from Levels One, Two, and Three were used in the course of instruction. When a topic was completed, topic inventories, as provided by the program, were administered. This report contains teacher ratings of each topic and activity used as well as detailed summaries of all test data obtained.

The test data attested to the appropriateness and effectiveness of the DMP materials for these subjects; the objectives of each topic attempted were mastered with few exceptions. Children's interest in the materials and instructional approaches was evidenced by a general willingness to begin new activities and by their maintaining appropriate behavior during the course of an activity.

The teacher's evaluation of these materials was very positive, but inadequacies were cited in the placement processes. The most important single factor in the opinion of the teacher of these children was that every student experienced success at his own pace and level.

I

INTRODUCTION

The purpose of this study was to assess the usefulness of the elementary mathematics program Developing Mathematical Processes (DMP) for educable mentally retarded (EMR) students.

DMP is a complete elementary mathematics program being developed by the University of Wisconsin Research and Development Center for Cognitive Learning. The materials used in this demonstration study were selected topics and activities of Levels One, Two, and Three of the 1972 Developmental Edition of Developing Mathematical Processes (1972).

The DMP materials emphasize giving students the opportunity to discover mathematics while manipulating and observing various materials that have been made a part of their environment. Instruction further centers about certain processes that people are postulated to use when they understand and solve problems. A process, as used in the program, is described as "A recognizable sequence of steps used to solve a particular type of problem in many different contexts [Developing Mathematical Processes, 1972, Teachers Manual]." Some of the processes identified by this program are: describing, representing, comparing, ordering, equalizing, joining, and separating.

Recent work in the area of mathematics for the mentally handicapped child emphasized the importance of a meaningful, concrete approach to mathematics instruction (e.g., Cawley & Goodman, 1969; and Connolly, 1973). Furthermore, there is evidence that the mentally handicapped can be taught problem solving in even the restrictive sense of word problems (Cawley & Goodman, 1969). It seems reasonable, therefore, to expect a program with the instructional approach of DMP to provide a measure of success for these children.

II

REVIEW OF LITERATURE

Major areas of research concern relating to mathematics programs and the EMR child have included differences between the mentally retarded and their mental-age peers (e.g., Cruickshank, 1948), difficulties the mentally retarded experience while solving verbal problems (Cawley & Goodman, 1969), and appropriate instruction for use with the mentally retarded child (e.g., Cawley & Goodman, 1969; and Connolly, 1973).

Cruickshank in particular has been a pioneer in research relating to EMR children. A line of research begun by Cruickshank and supported by others was summarized by Connolly (1973) in the following way.

> The mentally retarded were significantly inferior to their mental-age, normal peers in:
> 1. their ability to solve abstract and verbal problems;
> 2. their ability to solve concrete problems;
> 3. the understanding of the operation required to solve a problem;
> 4. their ability to isolate pertinent information from a body of given data; and
> 5. their work habits (which were characterized by carelessness and immaturity [p. 492].

Connolly (1973) acknowledged widespread acceptance of these conclusions, but faulted the reported research on the grounds of the limited scope and sample size of the studies reported, the appropriateness of the tests used, and the use of institutionalized subjects to make inferences to the much larger group of children regularly attending the public schools. He finally summarized this research in the following ways.

> This research strongly implies that the mentally retarded perform best on computation and functional areas of arithmetic; display definite weakness in those areas of arithmetic requiring verbal mediation; and exhibit definite weaknesses in work habits . . . .
>
> While research has documented the general mathematics performance pattern of the mentally retarded, it has not determined the extent to which this performance should be attributed to deficiencies associated with mental retardation. Undoubtedly, partial responsibility for this performance rests with the curriculum offerings and instructional practices the mentally retarded received [p. 493].

Cruickshank's (1948) conclusions indicate that a program focusing on problem solving processes may be inappropriate for EMR children. However, the weaknesses in research methodology that Connolly noted leave ample room to suppose that a carefully engineered program employing appropriate instructional methodology could prove to be quite appropriate for EMR children in non-institutional settings and that this could be true even though the materials were not designed with the EMR child in mind.

In line with this suggestion, Cawley and Goodman (1969) reported a formative study on the appropriateness of an arithmetical problem solving unit in curricula for the mentally handicapped. They too acknowledged such findings as those summarized by Connolly (1973), and in particular the generally poor performances of mentally handicapped children on problem solving tasks. They suggested, however, that "the characteristics measured in the research were in reality a function of inappropriate instruction. The mentally handicapped may experience difficulties . . . because these program components are not included in the curriculum at the appropriate development levels [p. 94].

Cawley and Goodman accepted the challenge inherent in their criticism and designed an instructional unit in problem solving intended specifically for the mentally handicapped child. Regular teachers of EMR children were provided with inservice instruction in methods to be used in teaching the unit in usual classroom settings. The children who worked through this unit showed significant gains in verbal problem solving. Cawley and Goodman therefore accepted the feasibility of a problem solving curricula for the mentally handicapped and called for the development of a comprehensive problem solving curricula for these children.

A final consideration of this review is of the role that objects or manipulatives should have in the mathematics curriculum for EMR children. Systematic research relating to this question seems to be lacking. However, there is no dearth of professional opinion (e.g., Connolly, 1973; Howell, 1972; and Jacobson, 1969). All agree that instruction must be carefully planned and that objects must play an important part in the overall instructional program. The recommendations of Cawley and Goodman (1969) are representative. They described an extensive teaching procedure for EMR students including two guidelines for the use of manipulatives. These guidelines are summarized as follows:

1. The manipulatives must be used in a meaningful, rather than a mechanical way.

2. The use of the manipulatives must be part of the learning process rather than just the product as is the case with most curricula for EMR children.

In summary then, much research would lead to rejection of a problem solving approach to teaching mathematics to EMR children. However, sufficient weaknesses in the methodology of the research has been noted that rejection of this approach is not required. Furthermore, Cawley and Goodman had considerable success in teaching EMR children verbal

problem solving tasks in the context of classroom settings commonly available for EMR children. On the basis of these findings, and the fact that manipulatives are used extensively in DMP and only in a manner consistent with the two recommendations cited above, it seems reasonable to expect that DMP materials can be successfully used with EMR children.

III.

DATA

SUBJECTS

The children involved in this study were a special education class of EMR students attending an elementary school in urban northwest Indiana. The class consisted of ten students, one white and nine black students. Their ages ranged from seven to twelve years. The I.Q.'s, where available, can be found in Table 1.

TABLE 1

POPULATION

Student	Age at Start of Study	I.Q.
Boys		
1. Student A	9 yrs. 7 months	
2. Student B	11 yrs. 2 months	62
3. Student C	12 yrs. 4 months	
4. Student D	10 yrs. 7 months	
5. Student E	10 yrs. 0 months	79
6. Student F	10 yrs. 6 months	61
7. Student G	7 yrs. 7 months	
8. Student H	9 yrs. 10 months	79
Girls		
9. Student I	8 yrs. 10 months	
10. Student J	10 yrs. 3 months	

The majority of the students have been in a special classroom since their second or third year in school. Although some of the students progressed fairly well using the regular mathematics text books, mathematics was still one of their weakest areas. Most of the students experienced difficulty in understanding concepts, applying old and new skills, and working with verbal problems.

PLACEMENT IN THE PROGRAM

Before beginning the three month demonstration study a series of placement inventories from the DMP program was given to the students. The inventories that were given were Check-Up Test 1.1, Placement Inventory A, and Placement Inventory C. Instructions and descriptions of the placement inventories and check-up test are found in the Assessment Manual of the DMP program (Developing Mathematical Processes, 1972). Student scores from these administrations are reported in the Appendix.

The decision about which inventories would be given to each student was made on the basis of the teacher's knowledge of the students and the objectives of Levels One through Three. Consequently Check-Up Test 1.1 was given first to student G and later to student F. Placement Inventory A was administered to students A, D, F, H, and I. Placement Inventory C was first administered to students B, C, E, J, and later to student D also.

Students F and G both demonstrated mastery of the prerequisites of Level One as measured by Check-Up Test 1.1. The failure of student F to show mastery of five Level One objectives as measured by Inventory A led to his placement at Level One along with student G. While students A, C, H, and I failed to demonstrate mastery of all Level One objectives as measured by Inventory A, their performances were judged to be adequate for their placement at Level Two. Student D, who had shown higher achievement than students A, H, and I earlier in the year, was also administered Placement Inventory C to see if he should be placed at Level Three.

The data from Inventory C caused some difficulty in terms of the placement of students. This inventory was administered to five students. The scores of the students B, C, D, E, and J indicated mastery of all Level Two objectives and all but two Level Three objectives. This should normally indicate placement at a level higher than Level Three. However, the teacher's judgment, based on knowledge of the past achievement of these children, was that they did not in fact have mastery of most Level Three objectives. Therefore, these five students were placed at the beginning of Level Three. The results of the pre-assessment for Topic 3.3, reported later in this chapter, substantiated the teacher's judgment in this matter. Table 2 summarizes the placements of all students based finally as much upon teacher judgment as upon the placement test scores.

STUDENT ACHIEVEMENT

The materials used were all from the 1972 Developmental Edition of the DMP program. Each level included a teacher's guide, an assessment manual, pupils' workbooks, activity cards, pupil profile cards, and a materials kit.

Both pre-assessments and post-assessments were used during the course of this study. Pre-assessments were used twice, while all available post-assessments were used. In particular, the pre-assessment for Topic 2.3 was administered to validate the teacher's judgment of student mastery prior to beginning the Topic, and the pre-assessment for Topic 3.3 was used following Topic 3.1 to see if any students had mastered the objectives of Topic 3.1. Post-assessments were used to formally assess student mastery of given objectives after the completion

TABLE 2

INITIAL PLACEMENT OF STUDENTS

Student	Placement Inventory	Placement Level
1. Student F	Inv. A and Check-Up Test 1.1	Level One
2. Student G	Check-Up Test 1.1	Level One
3. Student A	Inv. A	Level Two
4. Student H	Inv. A	Level Two
5. Student I	Inv. A	Level Two
6. Student D	Inv. A and Inv. C	Level Three
7. Student B	Inv. C	Level Three
8. Student C	Inv. C	Level Three
9. Student E	Inv. C	Level Three
10. Student J	Inv. C	Level Three

of each topic. There was no formal assessment available for Topic 3.1 of Level Three, however, as all objectives listed in that topic were preparatory objectives. The pre-assessment of Topic 3.3 did relate to these objectives, and so it was administered to provide some assessment of Topic 3.1.

Tables 3, 4, and 5 contain the evaluations of mastery of the objectives of each topic completed by the students. The tables all contain posttest data with the exception of Level Two, Topic 2.3, and Level Three, Topic 3.1.

TABLE 3

EVALUATIONS OF STUDENT MASTERY OF LEVEL ONE OBJECTIVES

Topics	Objectives	Ratings for Students* F	G
1.1	Chooses object	M	M
	States same or different	M	M
	Describes object	M	M
1.2	Compares two lengths	M	M
	Orders two lengths	M	M
1.3	Equalizes lengths	M	M

*M--Mastery, P--Making Progress, N--Needs Considerable Help

TABLE 4

EVALUATIONS OF STUDENT MASTERY OF LEVEL TWO OBJECTIVES

Topics	Objectives	Ratings for Students* A	H	I
2.1	Describes shape	M	P	M
	Chooses region	M	M	M
	States same or different	M	M	M
2.2	Compares two weights	M	M	M
	Orders two weights	M	M	M
2.3**	Writes numeral 0-10	M	M	M
2.4	Orders several occurrences	M	M	M

*M--Mastery, P--Making Progress, N--Needs Considerable Help
**Because of pre-assessment mastery, this topic was not taught.

The results of the postassessments indicated student mastery of all topic objectives following the completion of the activities of a topic. A single exception to this was that one student had a rating of P (Making Progress) for one objective of Topic 2.1. The objectives for Topic 3.1 were all preparatory and hence mastery of them would not be expected following the completion of the activities of that topic. The objectives for Topic 3.3 were exactly the same as those for Topic 3.1, however, and instruction on Topic 3.3 was to lead to mastery of the objectives. While Topic 3.3 was not taught, the pre-assessment for this topic was given to provide some evaluation of Topic 3.1. Several ratings of M (Mastery) and P (Making Progress) and only one rating of N (Needs Considerable Help) indicated that while progress had been made towards mastery of the objectives of Topic 3.1, instruction on Topic 3.3 would be necessary before they were mastered.

TEACHER RATINGS OF ACTIVITIES

The topics of the various levels provide lessons or activities to enable the students to achieve mastery of the given objectives. Tables 6, 7, and 8 list the levels, topics, and activities used by the students in this demonstration study. The tables also include a teacher rating of each activity that was used.

TABLE 5

EVALUATIONS OF STUDENT MASTERY OF LEVEL THREE OBJECTIVES

Topics	Objectives	Ratings for Students*				
		B	C	D	E	J
3.1**	Reads sentence	-	-	-	-	-
	Chooses equalization sentence	-	-	-	-	-
	Writes equalization sentence	-	-	-	-	-
	Validates sentence	-	-	-	-	-
3.2	Names figure	M		M	M	M
	Chooses figure	M		M	M	M
3.3***	Reads sentence 0-10	M		M	M	M
	Chooses equalization sentence 0-10	P		M	P	P
	Writes equalization sentence 0-10	N		P	P	P
	Validates sentence 0-10	P		M	M	M

*M--Mastery, P--Making Progress, N--Needs Considerable Help

**All four objectives were preparatory objectives and were not formally assessed.

***This topic was not taught. The pre-assessment was given to provide some information regarding the objectives of Topic 3.1.

TABLE 6

TEACHER RATINGS OF LEVEL ONE ACTIVITIES

Topics	Activities	Evaluations			Comments
		Good	Fair	Poor	
1.1	1.1.1	X			
	1.1.2	X			
	1.1.3		X		
	1.1.4	X			
	1.1.5	X			
	1.1.6		X		
	1.1.7	X			
	1.1.8		X		
1.2	1.2.1	X			
	1.2.2		X		
	1.2.3		X		
	1.2.4	X			
	1.2.5	X			
	1.2.6	X			
	1.2.7				Activity not used
	1.2.8		X		
1.3	1.3.1		X		
	1.3.2	X			
	1.3.3		X		
	1.3.4	X			
	1.3.5	X			
	1.3.6	X			

TABLE 7

TEACHER RATINGS OF LEVEL TWO ACTIVITIES

Topics	Activities	Evaluations			Comments
		Good	Fair	Poor	
2.1	2.1.1	X			
	2.1.2	X			
	2.1.3		X		
	2.1.4		X		
	2.1.5		X		
	2.1.6	X			
	2.1.7	X			
	2.1.8		X		
2.2	2.2.1	X			
	2.2.2	X			
	2.2.3				Activity not used
	2.2.4	X			
	2.2.5				Activity not used
	2.2.6	X			
	2.2.7	X			
	2.2.8		X		
2.3*	2.3.1 to 2.3.9				Not taught
2.4	2.4.1		X		
	2.4.2	X			
	2.4.3		X		
	2.4.4	X			
	2.4.5	X			
	2.4.6	X			
	2.4.7	X			

*Pre-assessment indicated mastery of the objectives of this topic.

TABLE 8

TEACHER RATINGS OF LEVEL THREE ACTIVITIES

Topics	Activities	Evaluations			Comments
		Good	Fair	Poor	
3.1	3.1.1	X			
	3.1.2		X		
	3.1.3	X			
	3.1.4	X			
	3.1.5				Activity not used
	3.1.6	X			
	3.1.7				Activity not used
	3.1.8	X			
	3.1.9	X			
	3.1.10	X			
	3.1.11	X			
3.2*	3.2.1	X			
	3.2.2	X			
	3.2.3	X			
	3.2.4	X			
	3.2.5	X			
	3.2.6	X			
	3.2.7-3.2.11				Activities not used

*This topic was not completed by the students.

These ratings were based on the following criteria:

1. The activity was neither too easy nor too difficult.
2. The activity was short enough for the students to maintain interest.
3. The students enjoyed working with the activity.
4. The activity contributed to the students' knowledge.

A rating of fair indicates that an activity failed to meet one of the above criteria in a significant way. A rating of poor would have been given if an activity had been unacceptable in terms of any of the above criteria.

A total of 60 activities were taught during the course of the three month trial. Sixteen of these activities were rated as fair; the remainder were rated as good. The reasons for the fair ratings were mixed and followed no particular pattern. If an activity of a completed topic was not

used, it was because in the judgment of the teacher the students had had enough experience with that type of activity, it was an optional activity, or it was an alternate to another activity in the same topic.

Beyond the ratings already reported, it can be noted that the students enjoyed working through all the activities and in particular enjoyed using the manipulative materials that were made available to them. The students working in Level One especially enjoyed working with the lots-a-links and unifix cubes while studying length in Topic 1.2 and Topic 1.3. The students in Level Two enjoyed working with the geometric shapes and figures in Topic 2.1 as well as the items used for measuring weights in Topic 2.2. The students working in Level Three were exposed to more of the manipulative items than at the other two levels; they particularly enjoyed the activities of Topic 3.1 which included the process of representing using the three modes--physical, pictorial, and symbolic.

IV

SUMMARY AND CONCLUSIONS

SUMMARY

The effects of the DMP program on these students were generally positive. Students mastered the objectives of the topics taught and, in the judgment of their teacher, thoroughly enjoyed working with the program. Their feelings about mathematics seemed to improve. They were eager to begin new topics and to master new concepts and skills. However, most important to the teacher was that every student experienced success at his own pace and level.

The teacher noted two major criticisms of the DMP program, however. The first concerns the placement inventories. It was felt that the inventories were not accurate in the placement suggested. Perhaps they should have included more detailed sample items from the levels which they covered. Secondly, more emphasis should have been given to developing computational skills, especially in Level Three.

LIMITATIONS

Certain limitations to this trial of DMP materials for use with EMR children should be noted: the time spent was limited to three months, the number of subjects was 10, and there was no control group. However, the teacher could use previous experiences with other groups of EMR children as a basis for comparison. Therefore, while these limitations are acknowledged, the following conclusions seem warranted.

CONCLUSIONS

This three month trial of the DMP program was a success. The teacher's overall judgment of DMP was that it is a good program to use either alone or as a supplement to the more usual mathematics program. However, if mathematics is to be related to the everyday life of the retarded child, and if concrete and manipulative objects are to be used as effective tools in the learning process, an entire instructional program such as DMP should be implemented.

The teacher also believed that a good mathematics program should stress the use of language and verbal information processing, a manipulative-discovery approach, and instruction individualized to match the current understanding of the learner. The DMP program was perceived as incorporating many of these characteristics.

GPO 809-187-4

REFERENCES

Cawley, J. F., & Goodman, J. O. Arithmetical problem solving: A demonstration with the mentally handicapped. Exceptional Children, 1969, 36, 83-88.

Connolly, A. J. Research in mathematics education and the mentally retarded. The Arithmetic Teacher, 1973, 20(6), 491-497.

Cruickshank, W. M. Arithmetic ability of mentally retarded children: Ability to differentiate extraneous material from needed arithmetic facts. Journal of Educational Research, 1948, 42(3), 161-170.

Developing Mathematical Processes (Developmental Edition). Chicago: Rand McNally & Company, 1972.

Howell, D. Project SOSO (Save Our Slow Ones). The Arithmetic Teacher, 1972, 19, 29-33.

Jacobson, R. S. A structured method for arithmetic problem solving in special education. The Arithmetic Teacher, 1969, 16, 25-28.

APPENDIX

Student Scores on Placement Inventories

CHECKUP TEST 1.1 RESPONSE SHEET

Topic	1.2		1.4			Colors and Sorting						1.8	1.14	1.8	1.14
Behavior	compares two lengths	orders two lengths	orders	several	lengths	identifies blue	sorts blue	identifies red	identifies yellow	sorts	colors	orders two sets	states number for set	orders two sets	states number for set
Name / Item	1a	1b	2a	2b	2c	3a	3b	3c	3d	3e	3f	4a	4b	4c	4d
Student G															
Student F															

(Note: A blank indicates a rating of correct. An [X] indicates a rating of incorrect.)

GROUP RESPONSE FORM FOR PLACEMENT INVENTORY A

NAME	Topic	1.1		1.2		1.3				1.4		1.8				1.14							2.3		
	Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Student I															X										
Student A												X													
Student D											X														
Student H								X	X																
Student F		X						X	X				X							X				X	X

GROUP RESPONSE FORM FOR PLACEMENT INVENTORY C: SIDE 1

Name	Part I: numerals missed	Part I: symbols missed	Part II: 2.11		3.8										2.7								2.9								3.1, 3.3			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Student E	None	< >																																
Student J	None	< >																						X										
Student C	None	None																																
Student B	None	None																																
Student D	None	None																																

DMP MATHEMATICS LEVEL THREE

GROUP RESPONSE FORM FOR PLACEMENT INVENTORY C: SIDE 2

Part II (continued)

Name	3.10			3.4				3.7	3.10	3.5, 3.7								3.10				
	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Student E																						
Student J																						
Student C																						
Student B																						
Student D																		X				

Name _____

INDIVIDUAL RESPONSE FORM FOR PLACEMENT INVENTORY C: FORM 1, PART II

Topic	Item description	Correct response	✓ if correct
2.11	Given set, writes number.	1. 18	
	Given number, constructs set.	2. marks 15 cars	
3.8	Given number, constructs set.	3. marks 34 drums	
		4. marks 57 baseballs	
	Given set, writes number.	5. 42	
		6. 75	
	Given number in expanded notation, writes in compact.	7. 83	
		8. 60	
	Given number in compact notation, writes in expanded.	9. 4(10) + 9	
		10. 5(10) + 0	
	Given three numbers, chooses largest.	11. 86	
	Given three numbers, chooses smallest.	12. 39	
2.7	Given two sets, chooses comparison sentence.	13. $8 \neq 7$	
		14. $5 = 5$	
	Given two sets, writes comparison sentence.	15. $7 \neq 6$	
		16. $6 = 6$	
	Given open comparison sentence, completes it.	17. any number but 8	
		18. 2	
		19. =	
		20. ≠	
2.9	Given two sets, chooses order sentence.	21. $8 > 3$	
		22. $4 < 5$	
	Given two sets, writes order sentence.	23. $9 > 8$	
		24. $3 < 4$	
	Given open order sentence, completes it.	25. any number < 7	
		26. any number > 2	
		27. <	
		28. >	
3.1, 3.3	Given closed equalization situation, chooses sentence.	29. 4 + 4 = 8	
	Given closed equalization situation, writes sentence.	30. 3 = 5 − 2	
	Given open equalization situation, writes sentence.	31. 7 − □ = 2 or 7 = 2 + □	
		32. 5 + □ = 6 or 5 = 6 − □	

Name _____

INDIVIDUAL RESPONSE FORM FOR PLACEMENT INVENTORY C: FORM 1, PART II

Side 2

Topic	Item description	Correct response	√ if correct
3.10	Given open equalization sentence, solves it.	33. 7	
		34. 3	
		35. 6	
3.4	Given set, groups by a specified number.	36. forms 1 group of 4 flags	
		37. forms 2 groups of 7 hearts	
	Given a grouping, writes grouping notation.	38. 4(8) + 2	
		39. 2(3) + 5	
3.7	Given closed addition or subtraction situation, writes sentence.	40. 7 - 4 = 3	
3.10		41. 10 + 3 = 13	
3.5, 3.7	Given open addition or subtraction situation, writes sentence.	42. 8 - 5 = ☐	
		43. 2 + 6 = ☐	
		44. 4 + ☐ = 9	
		45. ☐ - 7 = 3	
	Given an open sentence, solves it.	46. 5	
		47. 3	
		48. 10	
		49. 7	
3.10	Given an open sentence, solves it.	50. 6	
		51. 9	
		52. 9	
		53. 11	
		54. 5	

GPO 809-157-2